

Abstract

A VCSEL having improved diffraction loss, comprising a series of deposited material layers comprising the structure of the VCSEL, and an intracavity lens formed in one of the series of deposited material layers. In one preferred form of the invention, the VCSEL comprises a bottom mirror mounted to the top of a substrate; a bottom spacer mounted to the top of the bottom mirror; a gain region mounted to the top of the bottom spacer; a top spacer mounted to the top of the gain region; and a top mirror mounted to the top of the top spacer, such that a reflective cavity is formed between the bottom mirror and the top mirror; with at least one of the bottom mirror, bottom spacer, gain region, top spacer and top mirror containing a superlattice structure, and with an adjacent region being subjected to ion implantation and rapid thermal annealing so as to disorder the superlattice structure and change its index of refraction, whereby to create an intracavity lens so as to reduce diffraction loss.